

# FAILURE MODE EFFECTS ANALYSIS/CRITICAL ITEMS LIST

FMEA NUMBER: EC-PWP72-10      ORIGINATOR: JSC      PROJECT:EDFT-03

PART NAME: ACTIVE WIF ASSY	LRU/ORU PART NUMBER: SED39126415-301	QUANTITY: 1
P/N: SED39127151-301	LRU/ORU PART NAME: APFR	SYSTEM: GFE
LSC CONTROL NO: N/A	DRAWING/REF DESIGNATOR: SEE P/N	SUBSYSTEM: EVA
ZONE/LOCATION: STRD-2	EFFECTIVITY/AFFECT STAGE: STS-72	

### CRITICALITY:

CRITICAL ITEM: YES      SUCCESS PATHS: 2  
 CRITICALITY CATEGORY: 1R/2      SUCCESS PATH REMAINING: 1

END ITEM NAME: N/A  
 END ITEM FUNCTIONAL: N/A  
 END ITEM CAPABILITY: N/A  
 END ITEM FAILURE TOLERANCE: N/A

### REDUNDANCY SCREENS:

- A/1. C/O PRELAUNCH: Pass
2. C/O ON ORBIT: N/A for NSTS
- B/3. DETECTION FLIGHT CREW: N/A
4. DETECTION GROUND CREW: N/A
- C/5. LOSS OF REDUNDANCY FROM SINGLE CAUSE: Pass
6. ON-ORBIT RESTORABILITY: N/A for NSTS

FUNCTION: The APFR WIF allows connections of the APFR to structure of the TERA. It consists of passive and active halves. The active half is on the APFR. The WIF mechanism acts as a latch. The WIF pedal is depressed, the mechanism is deactivated and the halves can be separated. A locking collar prevents inadvertent activation of the pedals.

FAILURE MODE CODE: N/A for NSTS

FAILURE MODE: Inadvertent separation of WIF halves.

CAUSE: Contamination, wear, piece part defect.

REMAINING PATHS: 1 Locking Collar.      EFFECT/MISSION PHASE: EVA

CORRECTIVE ACTION: Proper activation of locking collar prior to EVA crew entering APFR shall prevent inadvertent release.

### -FAILURE EFFECTS-

END ITEM/LRU/ORU/ASSEMBLY: If double failure or single failure and a operational error occurred, the WIF halves will separate.

SUBSYSTEM/NEXT ASSEMBLY/INTERFACE: N/A.

SYSTEM/END ITEM/MISSION: Loss of use of APFR.

CREW/VEHICLE : Possible loss of equipment and collision damage to vehicle or EMU. Possible loss of crew.

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 ZONE/LOCATION: STBD-2      EFFECTIVITY/AFFECT STAGE: STS-72

HAZARD INFORMATION:

HAZARD: N/A

HAZARD ORGANIZATION CODE: N/A

HAZARD NUMBER: N/A

TIME TO EFFECT: Minutes  
 TIME TO DETECT: Seconds  
 TIME TO CORRECT: Seconds  
 FAILURE DETECTION/FLIGHT: Visual

REMARKS:

## -RATIONALE FOR ACCEPTABILITY-

(A) DESIGN: The Active WIF is designed to the requirements specified in JSC-33009, " Certification and Acceptance Requirements Document for the Articulating Portable Foot Restraint". The APFR is designed to withstand 4200 in-lb in bending and torsion and 274 lb in shear and tension using a factor of safety of 1.4. The WIF design incorporates a locking collar which prevents the latch activation levers from being depressed until rotation of the collar. Three tabs in the active probe engage a slot in the passive WIF to prevent separation. Only 2 of the 3 tabs are required.

(B) TEST: Applicable requirements per JSC-33205.

Acceptance: (performed pre and post environmental test and at predelivery acceptance)

- 1) Fit check of the Active and Passive WIF performed at PDA.
- 2) Force required to install the active and passive WIFs shall be between 3 and 10 lb. verified at PDA, PIA, Pre and Post Environmental test and during qualification thermal test.
- 3) Force required to activate paddles is between 2 and 10 lb. Two paddles must be depressed for actuation, and torque required to rotate locking collar is between 1 and 5 in-lb. verified at PDA, PIA, and qualification thermal test.

### Qualification:

Qualification Vibration : A vibration test was performed to the following levels for a duration of 1 minute in each axis as a part of the Bay two starboard integrated proto-flight vibration test:

X AXIS		Y AXIS		Z AXIS	
20 - 80 Hz	+3 db/oct	20 - 45 Hz	+10.0 db/oct	20 - 45Hz	.009g <sup>2</sup> /Hz
80 - 350 Hz	.040g <sup>2</sup> /Hz	45 - 600 Hz	0.060 g <sup>2</sup> /Hz	45 - 70 Hz	+12.0 db/oct
350 - 2000 Hz	-3db/oct	600 - 2000Hz	-6.0 db/oct	70 - 600 Hz	.050 g <sup>2</sup> /Hz
6.1 grms		7.7 grms		600 - 2000Hz	-6.0 db/oct
					7.0 grms

Qualification / Acceptance Thermal: Functional test performed at -100°F and +200°F. During one portion of the test a interface check between the passive and active WIF is performed with a minimum temperature difference of 100°F.

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**(C) INSPECTION:**

**Fabrication - All WIF components are verified to visibly clean individually.**

**Test - Quality Assurance surveillance is required at all test and inspections. Discrepancy reports are written on all noncompliances.**

**(D) FAILURE HISTORY: None**

**(E) OPERATIONAL USE:**

- 1) **Operational Effect - Separated WIF halves, APFR loose in PLB during EVA operations.**
- 2) **Crew Action - Discontinue use of APFR.**
- 3) **Crew Training - Crew trained in proper operation of WIF .**
- 4) **Mission constraint - None.**
- 5) **In Flight Checkout - Proper function verified during EVA operations.**

**(F) MAINTAINABILITY: N/A**

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**PREPARED BY: G. Wright**
**REVISION:**
**DATE: 8/10/95**
**WAIVER NUMBER:**


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